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Potential and limitations of organic and fair trade cotton for improving livelihoods of smallholders: evidence from Central Asia

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Abstract

Cotton is a leading agricultural non-food commodity associated with soil degradation, water pollution and pesticide poisoning due to high levels of agrochemical inputs. Organic farming is often promoted as a means of addressing the economic, environmental and health risks of conventional cotton production, and it is slowly gaining ground in the global cotton market. Organic and fair trade cotton are widely seen as opportunities for smallholder farmers to improve their livelihoods thanks to higher returns, lower input costs and fewer risks. Despite an increasing number of studies comparing the profitability of organic and non-organic farming systems in developing and industrialized countries, little has been published on organic farming in Central Asia. The aim of this article is to describe the economic performance and perceived social and environmental impacts of organic cotton in southern Kyrgyzstan, drawing on a comparative field study conducted by the author in 2009. In addition to economic and environmental aspects, the study investigated farmers' motivations toward and assessment of conversion to organic farming. Cotton yields on organic farms were found to be 10% lower, while input costs per unit were 42% lower; as a result, organic farmers' cotton revenues were 20% higher. Due to lower input costs as well as organic and fair trade price premiums, the average gross margin from organic cotton was 27% higher. In addition to direct economic benefits, organic farmers enjoy other benefits, such as easy access to credit on favorable terms, provision of uncontaminated cottonseed cooking oil and cottonseed cake as animal feed, and marketing support as well as extension and training services provided by newly established organic service providers. The majority of organic farmers perceive improved soil quality, improved health conditions, and positively assess their initial decision to convert to organic farming. The major disadvantage of organic farming is the high manual labor input required. In the study area, where manual farm work is mainly women's work and male labor migration is widespread, women are most affected by this negative aspect of organic farming. Altogether, the results suggest that, despite the inconvenience of a higher workload, the advantages of organic farming outweigh its disadvantages and that conversion to organic farming improves the livelihoods of small-scale farmers.

Key words: organic cotton, fair trade, livelihoods, economic performance, impact, Kyrgyzstan

Introduction

Cotton is one of the leading agricultural non-food commodities and ranks among the top consumers of agrochemicals. Accounting for 16% of insecticide releases, it exceeds all other major crops in terms of insecticide application[1]. Insecticides are responsible for a large proportion of acute and chronic health problems associated with the use of agrochemicals, representing 52% of those classified by the World Health Organization as extremely, highly or moderately hazardous. Many insecticides are designed to interfere with the physiology of pest species, that is, their nervous and reproductive systems. These chemicals are particularly hazardous as they can also affect human and animal health. Pesticides applied to cotton can potentially contaminate cottonseed oil and cottonseed derivatives fed to livestock, thereby entering the food chain[1,2]. As such, serious environmental and health risks are linked to conventional production of cotton. It is increasingly associated with problems such as soil fertility loss, water pollution and pesticide poisoning[1–5]. Cotton is mainly produced in developing countries: 99% of the world's cotton farmers live in such countries and produce 75% of the world's cotton[1]. The majority are small-scale, resource-poor farmers who

cultivate cotton as a cash crop. Production bears inherent economic risks that are further compounded by rising input costs for fertilizers, fuel and pesticides as well as by low cotton prices due in part to highly subsidized production and export in the USA and the EU[6–8], fluctuating yields[9] and volatile world markets. Widespread indebtedness among conventional smallholding cotton farmers has led some, notably in India, to commit suicide[10].

In the late 1980s, non-governmental organizations began promoting organic farming as a means of addressing the economic, environmental and health risks of conventional cotton production[9]. The main difference between conventional and organic cotton production is that organic farmers avoid the use of chemicals, synthetic fertilizers, synthetic pesticides, herbicides, growth promoters or genetically modified organisms. Organic farmers' methods of nutrient management include crop rotation, intercropping and the use of compost and farmyard manure. Pest management is mainly based on preventive measures, crop rotation and the use of botanical pesticides[2,9].

In recent years, growing consumer interest in 'green' products has expanded organic cotton's share of the global cotton market; an increasing number of brands and retailers—mainly American and European—have launched or enlarged their organic cotton textile programs[11–13]. Between 2001 and 2009, the average annual growth rate of global retail sales of organic cotton products was 40%[13]. According to the estimates of Ferrigno et al.[14], in 2009 approximately 220,000 farmers—the majority of them smallholders—cultivated organic cotton on about 253,000 ha of land spread between 22 countries worldwide. Nevertheless, despite such impressive growth rates and global reach, organic cotton still only represents 0.76% of worldwide cotton production. The biggest players in the organic cotton trade are India, Turkey and Syria, who account for about 90% of global production combined. By contrast, Kyrgyzstan's share of global organic cotton production amounted to a modest 0.24% in 2008–2009[14].

Although—or perhaps because—organic cotton is a niche market, its production is increasingly seen as an opportunity for smallholding farmers in developing countries to improve their livelihoods based on higher returns and reduced economic, environmental and health risks. This view is supported by the growing market demand and the results of a number of studies on the profitability of organic cotton in Sub-Saharan Africa and Asia[7,9,15–17].

Despite an increasing number of studies comparing the profitability of organic and non-organic farming systems in different developing and industrialized countries, little has been published on organic farming in Central Asia. The present article investigates the performance of certified organic cotton production in southern Kyrgyzstan and compares it to conventional cotton production in the same region. Specifically, it examines the economic and social impacts of organic cotton production and perceived changes in soil qualities. In addition, it investigates small-scale farmers' motivation to convert to organic farming and the potential and limitations of organic farming to improve their livelihoods.

Organic and Fair Trade Cotton in Jalal-Abad Province

Cotton dominates the export market of most Central Asian countries, where it is cultivated as a monoculture with important environmental, social and political consequences[18]. Although much less important in Kyrgyzstan, relative to other Central Asian countries, cotton still made up about 25% of Kyrgyzstan's total agricultural export receipts between 2004 and 2007[6].

In 2004, with support from the Swiss State Secretariat of Economic Affairs (SECO) and the Dutch Interchurch Organisation for Development Cooperation (ICCO), the Swiss NGO Helvetas initiated organic cotton production in Jalal-Abad province, located in southern Kyrgyzstan's cotton-growing region. Known as the BioCotton Project, it began with 58 farmers. In the following years, impressive growth rates were observed in terms of the number of contracted farmers and the surface area of organic production. By the end of 2009, 765 organic farmers—including 420 officially certified—were contracted and organized into farmer groups. They cultivated a total of 1198 ha of land, 312 ha of which were reserved for organic cotton (source: Internal control system BioService Foundation). Compliance with organic standards (EU regulation 834/2007) was and is monitored by an internal control system and verified by an internationally accredited certification agency, the Institute for Marketecology (IMO) control, Switzerland. The process through which farmers' transition from in-conversion to certified organic status takes 3 years.

In 2007, two supporting institutions with complementary roles were founded in Kyrgyzstan: the BioFarmer Cooperative and the BioService Foundation. The main functions of the BioFarmer Cooperative, of which all local organic farmers are members, are organizing production (including provision of inputs) and processing, promoting organic farming, organizing farmers and lobbying. The BioService Foundation provides services to organic farmers such as training and consultation, internal control systems and marketing.

In 2004, Fairtrade Labelling Organizations International (FLO) established fair trade standards for seed cotton. Although it may not change the fundamental inequities and power relations in the existing commodity chains[19], fair trade adds a social and development perspective[7]. Fair trade is based on paying producers a guaranteed minimum price that varies according to the production context of each country. That minimum must be high enough to cover production costs and the producer's living expenses as well as the costs of registration, auditing and certification by the fair trade inspection body FLO-Cert. In addition to the minimum producer price, a premium is paid to the producer organization, namely, the BioFarmer Cooperative for

communal development projects. Smallholders participate in fair trade through membership-based producer organizations, which are audited by FLO-Cert to guarantee compliance with fair trade standards[20]. The BioFarmer Cooperative obtained fair trade certification in 2007 and received its first fair trade premium in 2008. Thus, certified organic farmers in the region now receive both organic and fair trade premiums for their cotton.

Research Approach and Methods

The impacts of the BioCotton Project were assessed in a field study in 2009[21]. The study focused on economic performance as well as the perceived social and environmental impacts of organic farming. The research approach was a twofold comparison: (a) comparing certified organic farmers to a control group of conventional farmers (systems comparison); and (b) comparing the organic farmers' situation before the start of the project to that in 2009, set against the general development of the control group's situation (time comparison). The study was carried out between June and October 2009, that is, during the 2009 cropping season. As such, crop production data belong to the 2008 agricultural year.

To compare organic farming with conventional farming practices, seven villages were selected according to the following criteria: high-enough number of certified organic farmers, equal representation of production zones and exclusion of villages with 100% organic farmers. The sample included 44 certified organic and 33 conventional farms. Organic farmers were randomly selected for interviews from the database belonging to BioService's internal control system. By contrast, conventional farmers had to be selected for interviews via convenience sampling (i.e., farmers readily available and convenient), since no lists were available and there was not enough time to compile such lists, and because it is scarcely possible to meet a specific individual without an appointment.

Data were mainly collected via questionnaire-based interviews with farm managers. Focus group discussions and expert interviews were used to clarify and deepen specific questions and emerging issues based on analysis of questionnaire data. To share and validate results, a validation workshop was held with representatives of different stakeholder groups, including organic and conventional farmers, extension agents, project staff and representatives of the BioFarmer Cooperative and the ministry of agriculture. The questionnaire covered quantitative aspects of agricultural production as well as the respondent's perception and assessment of observed changes in economic, social or environmental areas.

A number of difficulties were encountered during fieldwork. The most important were: (1) lists of (conventional) farmers were unavailable; (2) many conventional farmers had stopped cultivating cotton in 2008 due to unfavorable cotton prices and input prices, making it impossible to find equal-sized comparison groups in every village and leading to differences in sample sizes; and (3) the majority of farmers did not keep detailed records of production data. The researchers therefore had to rely on recall of data, which is prone to uncertainties.

Data Processing and Statistical Analyses

Statistical analyses were conducted using the program SPSS (SPSS Inc., Chicago, Illinois, USA). Due to the inherent limitations of recall data in terms of reliability, the data were basically analyzed with descriptive statistics. *t*-tests were used to test for significance of mean differences regarding household characteristics, perceptions of changes in workload and a global-scale assessment of the development of cotton production. Sex-disaggregated analyses were not viable, as the number of female farm managers was too small in both samples.

Results and Discussion

Given the organic cotton initiative's short duration of implementation in Kyrgyzstan—6 years—at the time the field study was conducted, the results presented here suggest short-term impacts of the BioCotton Project and cannot be used to determine the overall long-term viability of organic cotton production in the area.

Characteristics of small-scale cotton farming in Jalal-Abad

The organic and conventional farms surveyed did not significantly differ regarding basic household characteristics such as education level, sex and mean age of farm managers, ethnic group or family size. Depending on the village, respondents were either ethnic Kyrgyz or Uzbek. Over 80% of the farm managers who participated in the study were men. Only 11% of the organic farms in our sample were managed by a woman, in contrast to the 25% share of female farm managers counted by the BioCotton Project in 2009. This difference likely stems from the fact that our study only included certified organic farms, those run by farmers who joined the project in its initial years from 2004 to 2006, a time when organic farming was new to the area and men overwhelmingly pioneered.

Participants' land holdings were small: 68% of the organic and 76% of the conventional farmers in our study had less than 1 ha of irrigated land (mean: organic 1.07 ha, conventional 0.84 ha). Cotton, in addition to most other crops, is only produced on irrigated land. Other than cotton, the most important crops in the region are wheat, rice, maize, alfalfa and sunflower, used mainly for personal consumption or as animal feed. The majority of farmers in our study cultivated less than 0.5 ha of cotton (Fig. 1). While the requirements of organic farming limit the use of cropland for cotton to 50% of available land, conventional farmers are not subject to any such restrictions.

Farming was a key source of income for the respondents in our study, though not necessarily the most important. On

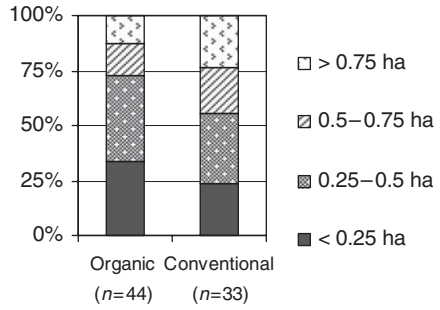

Figure 1. Area under cotton 2008 (ha).

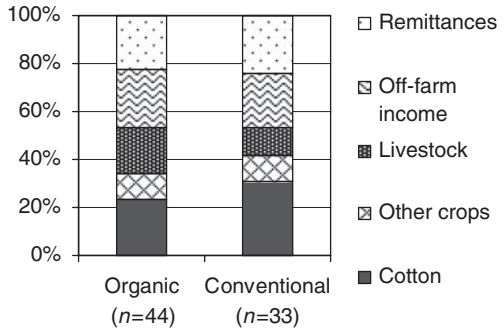

Figure 2. Average shares of household income in organic and conventional farms in 2008.

average, both the organic and conventional farming households surveyed derived half of their income from farming (53%) and half from off-farm activities (47%). In terms of the source farming income, the main difference between organic and conventional farming households was the relative importance of cotton and livestock (Fig. 2). Cotton was more important in the household budget of conventional farmers, in particular because they have no restriction on the area they may use for its cultivation. Livestock were more important for organic farmers than conventional farmers. Many more organic farmers (43%) than conventional farmers (19%) reported increasing the number of livestock they kept over the previous years. Organic farmers kept more livestock for the following reasons: first, manure from the livestock could be used as fertilizer; secondly, they were less likely to sell their animals for cash in times of need since their participation in the BioCotton Project provided them access to lines of credit for agricultural production; thirdly, they could obtain the cake of pressed cotton seeds for use as animal feed at no extra cost, in contrast to conventional farmers who must buy some of their animal feed.

For 7% of the organic farmers surveyed and 18% of the conventional farmers surveyed, off-farm income—such as remittances, salaries, business activities and pensions—accounted for more than 75% of total household income. Remittances are an important economic factor in southern Kyrgyzstan: 52% of the organic farms and 52% of the conventional farms surveyed had someone working abroad, usually young men. While labor migration and off-farm activities have positive economic effects, they limit the availability of labor for agricultural work, of particular relevance for organic farming. Slightly more adults (age $\geqslant 16$) worked full time on-farm in organic farming households (mean: 2.50 adults) when compared with conventional farming households (mean: 2.27 adults). In general, more women than men were found to work full time on-farm.

Why do farmers convert to organic farming?

A range of perceived advantages were found to motivate farmers to convert to organic farming, including: higher market prices for organic cotton (premiums), reduced costs for agricultural inputs, services provided by support organizations (e.g., access to credit, provision of seeds, marketing support, training, returning the cotton oil and press cake after ginning), reduced health risks and soil improvements. Most of the reasons for conversion cited by respondents could be characterized as economic. Similar economic motivations for conversion to organic farming have been found among smallholding coffee growers in Latin America[22], cotton growers in Africa[23] and farmers in Asia[24].

In general, the organic farmers interviewed were very conscious of the benefits of organic farming and the valuable support they received from BioService and the Cooperative. They assessed their previous decision to go organic—made several years earlier—in correspondingly positive terms: When asked what they would do if faced with the same decision today (2009), 91% stated they would convert to organic farming again. Twenty-seven percent of the organic farmers went as far as to say that they would not switch back to conventional farming under any circumstances. Interestingly, the majority of conventional farmers interviewed stated that they had considered converting to organic, but were deterred by aspects of organic cotton farming—real or perceived—such as the high labor input required, the requirement of crop rotation and the small size of their plot, lower yields, insufficient knowledge and a lack of livestock to produce the amounts of manure necessary.

Economic impact of organic cotton

As it was purely recall data and fraught with uncertainty, the study's production-related data do not enable definitive, in-depth quantitative economic analyses. Nevertheless, triangulation with qualitative data provides enough evidence to support the following conclusions regarding the profitability of organic cotton farming.

The certified organic farmers interviewed harvested an average of 2600 kg cotton per hectare in 2008, compared to 2900 kg per hectare harvested by the neighboring conventional farmers who were interviewed (basis: recall data). Thus, the production level of organic cotton farming was 10% below conventional cotton farming. Similar to the results reported by organic farmers in India[15], most of the organic farmers interviewed observed an initial decrease in cotton yields in the first 2 years after their conversion to

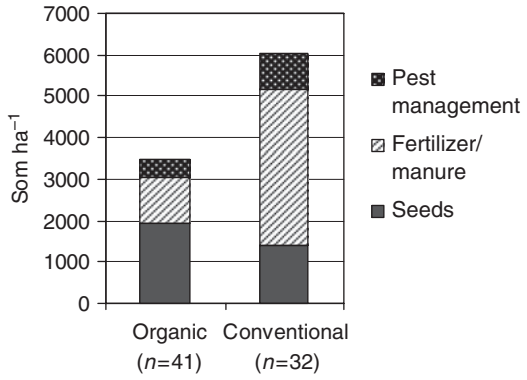

Figure 3. Input costs 2008 (Som ha^{-1}).

organic. However, according to their statements, their yields steadily increased each year after the initial 2-year post-conversion period, yet generally remained below the yield levels of conventional production. The interviewees identified crop rotation as a major cause of their initial decrease in yields. Due to the occasionally limited availability of manure and considerable labor input required many farmers initially only applied manure on areas where cotton was grown. Thus, in the second year following their conversion to organic farming, cotton was sown on land that was not fertilized with manure the previous year. Third-year stabilization of yields—though possibly still below the levels of conventional production—have been reported elsewhere by the International Fund for Agricultural Development (IFAD)[24] and others[2]. In addition to the dynamics of crop rotation, factors such as farmers becoming more experienced in organic farming and the general effects of soil restoration may also contribute to gradual increases in yields following the initial 2-year post-conversion period[2,7,15,25,26].

The organic farmers interviewed spent 42% less on agricultural inputs (Fig. 3). Although they paid more for seeds, they invested little money in pest management or fertilizer, as no non-organic inputs are allowed and few external inputs were purchased. The organic farmers who received manure from other farms were usually given it free of charge. At the time of the field study in 2009, the exchange rate of Euro to Som was approximately 1 : 60.

The prices of fuel and machinery rentals have increased markedly in recent years, in particular between 2007 and 2008[27]; this affects both organic and conventional farmers. However, conventional farmers suffer more due to spikes in prices for agricultural inputs such as fertilizer, herbicides and pesticides. These price dynamics were reflected in the way respondents judged the development of production costs in the years leading up to our survey. Every second organic farmer perceived their production costs to be lower in 2008 when compared with the period prior to their conversion. This was almost unanimously attributed to the fact that organic farming eliminates purchases of fertilizer and agrochemicals. In contrast, 90% of the conventional farmers interviewed complained that their production costs had increased compared to 3 or 4 years before. The research methodology used did not enable collection of precise data on labor inputs or costs incurred due to rental of agricultural machinery. However, most farmers agreed that organic farming is more labor intensive than conventional farming. Following conversion, 60% of the organic farmers interviewed noted an increase in their workload; they mainly attributed the labor increase to the use of manure and compost, which must be transported to the fields and spread manually. Thus, labor costs appear to be higher in organic farming. However, precise quantification was not possible on the basis of our data.

Organic farmers in the study area may sell their cotton at a fixed price agreed upon by the BioFarmer Cooperative and international buyers. Prices of conventional cotton fluctuate considerably from month to month and may vary greatly depending on whether the cotton is sold right off the field to businessmen or to a ginnery following harvest. The value of organic seed cotton shown in Table 1 is the value after deducting the fees for services provided by the BioService Foundation (e.g., organic certification and marketing) and membership fees of the BioFarmer Cooperative. These costs amounted to 6.52 Som kg^{-1} in 2008. Thus, in 2008 the price paid for organic cotton was 26.89 Som kg^{-1}, which was 9.8% higher than the average price paid for conventional cotton in the same year.

Twice as many organic farmers (58%) as conventional farmers (29%) perceived an increase in the prices they received for their cotton in the years leading up to the survey. Conventional farmers frequently complained of declining cotton prices. Although prices had not decreased in absolute terms (see Table 1), they had in relative terms, as inflation was high in the study area—about 25% in 2008[28]. Thus, the cost–benefit ratio of cotton production was worsening, something the conventional farmers felt acutely due to their dependency on agrochemicals.

Organic farmers' revenue from cotton was 20% higher (85,774 Som ha^{-1} compared to 71,102 Som ha^{-1} in 2008). Revenue from cotton was calculated on the basis of yields and the average market value of cotton (including the organic price premium) but without considering rotation crops. In 2008, the difference in gross margin (calculated on the basis of the revenue minus input costs) was 27% in favor of organic cotton (Fig. 4).

While the study's data on labor costs and machinery costs are not sufficient to support definitive conclusions, the author's interviews led her to believe the following: labor costs in the study area were likely higher for organic farmers than conventional farmers, while organic farmers may have incurred less costs for rental of agricultural machinery, precisely because organic farming relies more on manual labor (e.g., fertilizing, weeding and pest management). However, many conventional farmers also described facing difficulty in gaining access to agricultural machinery due to its general unavailability, a fact confirmed by the Food and Agriculture Organization and the World Food Programme[27]. As such, many conventional farmers in the

Table 1. Development of cotton prices 2006–2009.

	Organic (value in Som kg^{-1})[1]					Conventional (Som kg^{-1})
	Seed cotton[2]	Cotton oil/cake	Cotton linter	Fair trade premium	Organic and fair trade cotton (total value)	Conventional cotton (average market price)
2006	16.50	4.20	0.61	–	21.31	15.50
2007	20.80	8.56	0.84	–	30.20	23.00
2008	20.37	9.25	0.99	2.47	33.02	24.50

[1] At the time of the field study in 2009, the exchange rate of Euro to Som was approximately 1 : 60.
[2] Fees for services provided by the BioService Foundation, certification costs and BioFarmer Cooperative membership fees have already been deducted (these costs amounted to 6.52 Som kg^{-1} in 2008).
(Source: Compiled by BioService Foundation, 2009, pers. comm.)

study area also relied on manual labor, possibly resulting in minimal differences between the two farming systems in terms of costs incurred for rental of agricultural machinery.

To measure the development of cotton production over time, the researchers created a global-scale assessment of cotton production that includes cotton yields, production costs, cotton prices and revenues. Internal consistency for this global scale was satisfactory (Cronbach's Alpha = 0.7). Organic farmers' assessment was more positive than that of conventional farmers. Statistical analysis (*t*-test) showed that this mean difference was significant ($P < 0.001$).

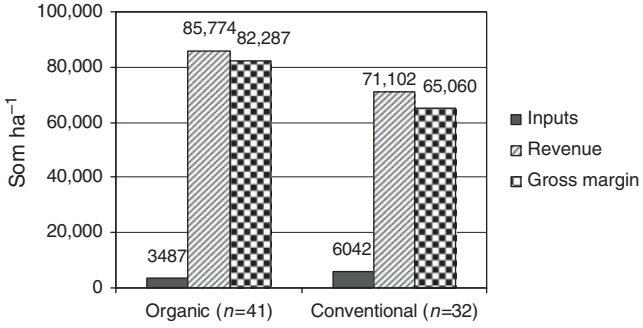

Figure 4. Gross margin 2008 (Som ha^{-1}).

Other economic benefits

The economic benefits of organic cotton production extend beyond mere revenue increases from the cotton itself. The organic cotton farmers in the study area also received valuable cotton by-products such as cotton oil for human consumption and cottonseed cake as animal feed. In addition, the organic farmers were afforded lines of credit on favorable terms, marketing assistance and access to other support services. The microcredit sector in Kyrgyzstan has grown in recent years. Yet, conventional smallholder farmers continue to face difficulty in gaining access to loans—interest rates are generally high for them and they often lack the necessary collateral[27]. Of the organic farmers interviewed, 84% claimed to have access to credit if they needed it. In contrast, only 58% of the conventional farmers interviewed claimed to have such access. Nevertheless, many of the respondents stated they were uninterested in taking out loans—even if they had access—due either to religious reasons or to fears of indebtedness.

Each of the added economic benefits enjoyed by organic cotton farmers in the study area are described in greater detail below.

Access to credit. The BioFarmer Cooperative collaborates with the microfinance institution *Agrokreditplus* to provide organic farmers with easily accessible lines of credit on favorable terms, for use in agricultural activities. The loans are secured by social collateral. Easy access to credit was a major reason as to why organic farmers in the study area were able to increase the number of livestock they held; in contrast to conventional farmers, they were not forced to sell their animals for cash in times of urgent need.

Marketing support. Collection, delivering and marketing of organic cotton is organized by the BioFarmer Cooperative. The cooperative also negotiates terms of sale with an international client, who in 2008 was a single buyer in Germany. Thus, organic farmers in the area had a *de facto* guarantee for selling their cotton at a fixed premium price. In contrast, conventional cotton farmers were forced to organize their own marketing; some sold to nearby ginneries while others sold directly to businessmen right off the farm. Unlike the organic farmers, the conventional farmers were very exposed to fluctuations in the global price of cotton.

Extension and support services. The BioService Foundation provides agricultural extension services and training to organic farmers. These were highly appreciated by the organic farmers interviewed. In contrast, conventional farmers in the study area only received limited and sporadic support from the government, for example, in cases of severe climate-related difficulties; they cannot rely on continually functioning governmental extension and support services, either because these do not exist or—as other studies suggest—because the farmers are not aware of the government services available to them[29].

Provision of cotton seeds. Organic farmers in the study area were provided cotton seeds from a seed fund. The seeds were essentially given to them as an

interest-free loan, as the costs of the seeds were only deducted once they received the cotton oil and cake the following winter.

Ecological impact

Almost all of the organic farmers interviewed perceived positive impacts of organic farming on the fertility and water-holding capacity of their soils (Table 2).

They attributed improvements in the water-holding capacity of soils almost exclusively to the use of manure. They also credited the use of manure with increasing the fertility of their soils, in combination with the introduction of crop rotation, cultivation of alfalfa, and discontinuing use of agrochemicals. In addition to fertilizing using manure, the organic farmers produced and applied compost. The organic farmers also suggested that the manure had positive effects on the structure of soils, reducing their workload as the soils became softer and easier to work. As the researchers made no soil analyses or measurements, the organic farmers' perceptions of improved soil qualities could not be confirmed. However, it is known that proper organic management builds up soil organic matter and increases populations of soil organisms[2], thereby improving soil qualities; similar positive soil effects have been reported by a number of studies from different regional contexts[9,7,24]. Finally, the organic farmers claimed that crop rotation and the use of manure generally had a positive effect on the occurrence and management of pests and diseases.

In contrast, the conventional farmers interviewed generally perceived deteriorating soil qualities over the years; only a few observed improvements, which they usually attributed to the use of manure. They attributed decreases in soil fertility to a total lack or an insufficient amount of manure and the (excessive) use of chemicals or fertilizers. Some respondents noted that their soils appeared to require more fertilizer with each year. This could possibly be due to a combination of the following factors: (a) decreasing soil organic matter content—on average, the conventional farmers interviewed used a bigger share of their available manure for fuel and 14% did not use manure as a fertilizer at all, while 79% did not produce compost; (b) limited availability of manure; and (c) nutrient depletion, as 42% of the conventional farmers who responded did not practice crop rotation.

Social impact

After economic benefits, improved health conditions were the second-most perceived positive change cited by organic farmers. They attributed health improvements to their consumption of what they subjectively considered healthier foods as well as to their reduced exposure to hazardous agrochemicals, which they no longer applied to their fields. In connection with health aspects, they again emphasized the importance of the organic cottonseed oil and the organic seed cake that they received as an in-kind payment for processing their cotton. Even conventional farmers pointed to this advantage of organic farming. While there is no proof of safer, higher-quality food being produced by organic farmers in the study area, there is evidence for the risk of food contaminated by pesticide residues in the case of conventional farming nearby[1,2]. Soviet-era cotton production in the region was characterized by the use of highly toxic pesticides, some of that are still being used in neighboring Uzbekistan; pesticides that are currently banned in Kyrgyzstan are regularly smuggled in from Uzbekistan illegally[1]. The distance of the study area to the Uzbek border ranged between 10 and 40 km. Thus, considering the problem of these dangerous pesticides could apply to conventional cotton farming in the study area, the organic farmers' perception might be interpreted as an expression of relief over having reduced their risk of consuming foods contaminated by toxic pesticides.

Table 2. Perception of changes in soil qualities over the past few years (percentage of farmers).

	Improved	The same	Declined
Soil fertility			
Organic	95%	5%	0%
Conventional	16%	39%	45%
Water-holding capacity of soils			
Organic	88%	12%	0%
Conventional	10%	49%	41%

In southern Kyrgyzstan, widespread labor migration of men increases the workload of women independent of the farming system used. Nevertheless, 60% of the organic farmers interviewed reported that the conversion to organic farming had increased their workload in the years leading up to the survey. Organic farmers perceived a higher increase in workload—overall farm workload, workload for cotton and women's workload—than that perceived by their colleagues using conventional farming methods. Again, this mean difference proved statistically significant ($P < 0.05$). Independent of the production type, more women than men perceived an increase in their workload. The perception of workloads did not differ much between men and women on conventional farms. In contrast, men's and women's perception of the workload differed greatly on organic farms. The vast majority of female respondents from organic farms (farm managers or wives) perceived higher workloads. It was generally agreed that organic farming requires more manual work, is more labor intensive, and that women in particular must bear the negative effects because (a) manual work is typically done by women, and (b) the work-related outmigration of men has left more work to women in general. Indeed, the biggest negative impact perceived by respondents in regards to organic farming—an increased workload—appeared to affect women the most.

Many more organic (53%) than conventional (30%) farmers perceived improved cooperation between farmers. The cooperation appeared to occur mainly within the

community of organic farmers. For example, the organic farmers exchanged experiences, advice and consultation and shared agricultural machinery. Organic farmers cited the BioCotton Project as the main reason behind such improvements; its frequent meetings were perceived as uniting the (organic) farmers and fostering cooperation. According to some respondents, cooperation often began among organic farmers, then spread to conventional farmers when they became interested in certain techniques (e.g., organic pest control) and asked their organic-farming neighbors and colleagues for advice. A similar multiplication effect was observed in many villages, leading to improved cooperation across the whole farming community. Nevertheless, a minority of organic and conventional farmers perceived deteriorating cooperation and sense of community, which they attributed to increasing individualism.

Potential and limitations for improving livelihoods

The results of our study suggest that organic farming is capable of improving the livelihoods of resource-poor small-scale farmers in the context of southern Kyrgyzstan. The economic benefits of fair trade organic cotton were widely acknowledged by organic farmers. However, these benefits did not simply stem from the higher value of organic cotton or higher farming grosses *per se*, but instead resulted from a combination of factors, foremost among them: (1) guaranteed sales of organic cotton for a higher, fixed price (organic plus fair trade premium) and partial pre-financing of the cotton harvest; (2) lower input costs and independence from agrochemicals; (3) access to timely credit on favorable terms; (4) support services from BioService and the BioFarmer Cooperative (extension and training, seed provision, marketing and lobbying); and (5) the provision of uncontaminated cotton oil and seed cake.

Organic farmers' livelihoods also appeared to benefit from a reduction of agronomic, environmental, health and economic risks. Crop rotation, a requirement of organic farming, results in more diversified production, which is associated with lower agronomic risks and higher food security compared to conventional farming—in contrast, one-third of the conventional farmers in the study sample produced cotton as a monoculture. Organic farming was also perceived to improve soil qualities and to greatly reduce health risks, as organic farmers were no longer exposed to toxic synthetic pesticides and did not consume contaminated cotton oil. Finally, the organic production methods combined with available support services seemed to reduce the overall economic risks faced by small-scale organic farmers in the study area.

Despite these positive results, certain limitations of organic farming should not be overlooked. Four key limitations were observed in the study area: First, the organic farmers perceived an increase in their workload. This appeared to affect women in particular, compounding the burden they were forced to bear due to male labor migration and the resulting labor shortages. Local stakeholders were asked whether they thought the 2009 global economic crisis would work to ease labor shortages in the study area. They suggested that local labor shortages would not be solved by the return of migrants who had lost their jobs in Russia because: (a) young people are generally uninterested in agricultural work, (b) those who lost their jobs abroad would likely stay there and look for new opportunities, and (c) those who did return would likely avoid agricultural work in favor of other business pursuits or off-farm activities. Thus, labor shortages likely remain a challenge in southern Kyrgyzstan's agricultural sector and may pose a constraint to widespread conversion to organic farming, even among farmers interested in making the transition. Secondly, in 2009, organic farmers still had very limited room for maneuver regarding adaptation to market trends and fluctuations, as cotton was the only crop fetching a higher price for organic production. Although the farmers did sell their rotation crops,—wheat, sunflower, etc.—none of them could be sold as organic, that is, at a higher premium price, because no local or regional market for organic crops existed and efforts to find an international buyer were hitherto unsuccessful. Thirdly, landholdings in the study area were small, and farmers of very small plots see little benefit in converting to organic farming. Fourthly, in some cases, insufficient supplies of manure presented a limitation to organic farming in the study area.

Conclusions

The period of conversion to organic farming is a critical time for small-scale farmers. During conversion, farmers' profits are typically reduced due to lower yields and because in-conversion cotton is ineligible for certified-organic premiums. Thus, to encourage organic farming, it appears necessary to offer interested farmers additional support to bridge the initial conversion phase; this was done in the study area by paying in-conversion farmers the fair trade minimum price plus a small premium. In southern Kyrgyzstan, organic farming would be much more attractive and profitable if rotation crops were also eligible for organic premiums. Past efforts to develop a local market or tap into international markets have been relatively unsuccessful—continuous work in this area is necessary.

The present study on Kyrgyz cotton production confirms the earlier conclusion of Nemes[16] based on analysis of over 50 case studies worldwide comparing the economic performance of organic and non-organic farming systems: organic price premiums appear crucial to the economic performance of organic farming; when combined with lower production costs, organic farms may become more profitable than conventional farms. The economic advantage of organic farming appears even greater if one considers the use of synthetic fertilizers and pesticides in conventional cotton production. Their use reportedly bears high risks for human and animal health as well as environmental damage, and may therefore lead to considerable

economic costs—for example, due to medical treatment, loss of animals or labor force. Frequently overlooked, these types of costs should also be considered when comparing the economic performance of production systems.

With its tiny market share—less than 1% of global cotton production—organic cotton currently represents a viable option and a lucrative niche for many small-scale farmers in developing countries, in particular due to attractive price premiums. However, these premiums may encourage more and larger producers to enter the market, which could in turn drive down the price premiums commanded by organic cotton[7]—a dynamic that has been previously observed in connection with established organic commodities such as rice, sugar and coffee[24]. Should this happen, organic cotton may lose some of its attractiveness to small-scale farmers.

In order to verify the positive impacts of organic cotton suggested above and the long-term viability of organic cotton farming in southern Kyrgyzstan, additional research is needed that includes measurements of important soil parameters as well as systematic, quantitative economic assessments of the costs and benefits of organic and conventional production systems. In light of the limitations of the present study regarding economic and soil data, the author recommends that organic initiatives strive to monitor the economic and ecological performance of organic and conventional farming more systematically. However, proper monitoring will require good baseline data, for example, yield levels and the status of soil fertility prior to conversion. In addition to collecting information on organic farms for an internal control system, it would also be useful to collect selected key information on conventional farming for the sake of comparative analysis and monitoring.

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